

Appl. No. 09/407,475
Amt. Dated 07/18/2003
Reply to Office Action of June 30, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the Application:

Listing of Claims:

1. (currently amended) A safety switching assembly for linking voltage lines to device input nodes and for selectively and remotely electrically isolating the device, the apparatus comprising:

- 5 a control configuration for selectively linking and delinking the voltage lines to and from the device, respectively;
a controller for controlling the control configuration; and
a grounding configuration for, when the voltage lines are delinked from the device, linking short-circuiting the input nodes to ground.

2. (currently amended) ~~The assembly of claim 1~~ A safety switching assembly for linking voltage lines to device input nodes and for selectively and remotely electrically isolating the device, the apparatus comprising:

- 5 a control configuration for selectively linking and delinking the voltage lines to and from the device, respectively;
a controller for controlling the control configuration; and
a grounding configuration for, when the voltage lines are delinked from the device, linking the input nodes to ground,

10 wherein the control configuration includes an isolation contactor including one normally open (NO) isolation contact for each voltage line and including an isolation coil, each isolation contact linking an associated line to a separate intermediate node adjacent the device, the controller controlling provision of current to the isolation coil.

3. (original) The apparatus of claim 2 wherein the isolation contactor also includes one normally closed (NC) isolation contact and wherein the grounding configuration includes one

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- NO ground contact for each line and a ground coil, each ground contact linking a separate one of the intermediate nodes to ground, the ground coil in series with the NC isolation
5 contact and a power source.
4. (original) The apparatus of claim 3 wherein the controller includes at least one safety contact in series with the isolation coil and a switch for opening and closing the safety contact.
5. (original) The apparatus of claim 4 further including an indicator in series with the switch which, when current passes therethrough, indicates current flow.
6. (original) The apparatus of claim 5 wherein the indicator is a light.
7. (original) The apparatus of claim 5 further including an additional NO ground contact in series with the switch and the indicator.
8. (original) The apparatus of claim 7 further including a ground conductor linked between ground and a grounding node, each ground contact linked to the grounding node, a ground control relay including a ground control coil and a NO ground control contact, the ground control coil linked between the grounding node and one of the voltage lines, the
5 ground control contact linked in series with the switch, the indicator and the ground contact in series with a power source.
9. (original) The apparatus of claim 3 further including a ground conductor linked between ground and a grounding node, each ground contact linked to the grounding node, a ground control relay including a ground control coil and a NO ground control contact, the ground control coil linked between the grounding node and one of the voltage lines, the
5 ground control contact linked in series with a power source.
10. (original) The apparatus of claim 4 wherein the safety contact is a first safety contact, the apparatus further including a second NO safety contact which is also controlled by the switch, a control relay including a first NO control relay contact and a control relay coil, the

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5 first and second safety contacts forming a parallel contact pair, the pair in series with the control relay and a power source.

11. (original) The apparatus of claim 10 wherein the control relay contact is in series with the isolation coil and a power source.

12. (original) The apparatus of claim 11 wherein the control relay further includes a first NC control relay contact in series with the ground coil.

13. (original) The apparatus of claim 10 wherein the control relay further includes a second NC control relay contact in series with the switch.

14. (original) The apparatus of claim 10 wherein the control relay contact is in series with the ground coil.

15. (original) The apparatus of claim 10 wherein the control relay contact is in series with the switch.

16. (original) The apparatus of claim 3 wherein the isolation contacts are first isolation contacts and the apparatus further includes a second isolation contactor including a separate NO second isolation contact for each voltage line and a second isolation coil, each second isolation contact in series with a separate one of the first isolation contacts, the control circuit
5 also for controlling current to the second isolation coil.

17. (original) The apparatus of claim 3 wherein the ground coil is mechanically linked to the isolation coil such that closure of the ground coil and the isolation coil are mutually exclusive.

18. (original) A safety switching apparatus for linking voltage lines to a device and for selectively and remotely electrically isolating the device, the apparatus comprising:
first and second voltage rails;
an isolation contactor including one normally open (NO) isolation contact for each
5 voltage line and including an isolation coil, each isolation contact linking an associated line

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to a separate intermediate node adjacent the device, the isolation contactor also including one normally closed (NC) isolation contact;

at least one safety contact in series with the isolation coil between the rails;

a control circuit for controlling the at least one safety contact;

10 a ground contactor including one NO ground contact for each line and including a ground coil, each ground contact linking a separate one of the intermediate nodes to ground, the ground coil in series with the NC isolation contact between the rails; and
a switch linked to the control circuit for closing and opening the safety contact.

19. (currently amended) A safety switching method to be used with a device which is supplied voltage on voltage supply lines, the method for ensuring that the device has been electrically isolated when electrical isolation is selected, the method comprising the steps of:

determining when device isolation has been selected; and

5 grounding short-circuiting the supply lines to ground.

20. (original) The method of claim 19 further including the step of indicating via the indicator that the supply lines have been grounded.

21. (currently amended) ~~The method of claim 19 also for use with a grounding conductor~~
A safety switching method to be used with a device which is supplied voltage on voltage supply lines and also for use with a grounding conductor, the method for ensuring that the device has been electrically isolated when electrical isolation is selected, the method
5 comprising the steps of:

determining when device isolation has been selected; and

grounding the supply lines,

wherein the step of grounding includes the step of linking the supply lines to the grounding conductor and wherein the method further includes the steps of monitoring the
10 grounding conductor to ensure that the conductor remains grounded and, if the grounding conductor is ungrounded, indicating the ungrounded condition via the an indicator.

22. (previously presented) A safety switching system for use with a manufacturing line which includes a plurality of stations, the plurality of stations linkable to voltage supply lines at input nodes, each station having an access, the system for remotely facilitating electronic

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isolation of the plurality of stations and for indicating said isolation on an access by access

5 basis, the system comprising:

a control configuration for selectively linking and delinking the voltage lines to and from the plurality of stations, respectively;

a grounding configuration for, when the voltage lines are delinked from the plurality of stations, linking the input nodes to ground;

10 a switch for each access that is positioned proximate each access, each switch positionable in at least a first position wherein the switch causes the control configuration to link the voltage lines to the plurality of stations and a second configuration wherein the switch causes the control configuration to delink the voltage lines from the plurality of stations; and

15 an indicator for each access that is positioned proximate each access, each indicator indicating electrical isolation of a corresponding station when a switch associated with the corresponding station is in the second position and the lines are grounded.